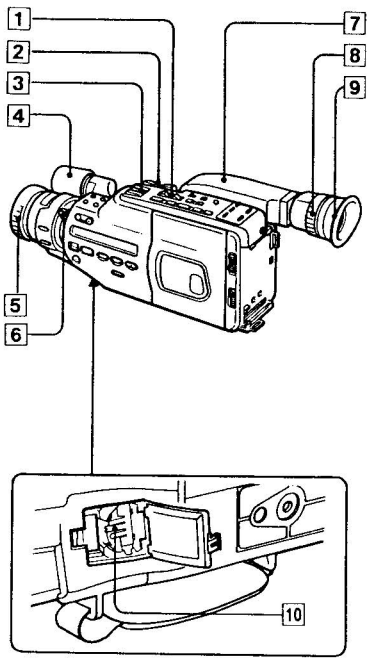
SECTION 1
GENERAL

Identifying the Parts

(A-1)



For details on the use of each control, refer to the pages indicated in the circle.

(A-1)

1 **POWER switch**
CAMERA: for camera recording
PLAYER: for playing back or editing tapes
OFF: power off

2 **Power zoom button** ⑱

3 **Accessory shoe**
Attach a video light, external microphone, etc. (not supplied).

4 **Built-in microphone (monaural)**

5 **Lens hood (Focus ring)** ㉛

6 **Zoom lever** ⑱

7 **Viewfinder**
The picture being recorded or played back can be monitored in black and white here. Also, marks such as caution indicators and function mode appear here.

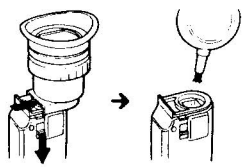
8 **Viewfinder lens adjustment ring** ㉑

9 **Eyecup**

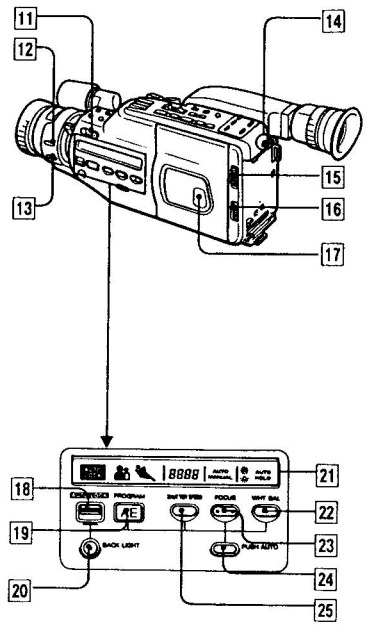
10 **Lithium battery compartment (bottom)** ⑱

To remove dust from inside the viewfinder (A-2)
Detach the eyecup as illustrated and clean the surface of the screen with a blower.

(A-2)



(A-3)



(A-3)

11 **EDITSEARCH (and recording review) button** ㉖

12 **FADER button** ㊶

13 **MACRO AF (Autofocusing in macro) button** ㉜
Press to record close-ups with automatic focusing.

14 **Camera recording/battery lamp**
Lights up during recording and blinks when the battery becomes weak.

15 **EJECT (cassette eject) button** ⑳

16 **BATT (battery eject) knob** ⑫

17 **Cassette holder**

18 **AUTO LOCK switch** ㉙
When you record with automatic adjustment, set this switch to the green position.

19 **PROGRAM AE (programme auto exposure) button** ㉟

20 **BACK LIGHT button** ㉟

21 **Display window**

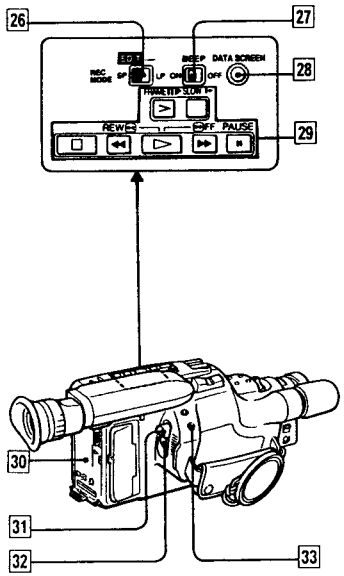
22 **WHT BAL (white balance) button** ㊷

23 **FOCUS button** ㉛

24 **PUSH AUTO button** ㉛

25 **SHUTTER SPEED button** ㉞

(A-4)



(A-4)

26 **REC MODE (recording mode)/EDIT switch** ㉒ ㊾

Switch it depending on the operating mode.

Mode	Recording	Playback	Editing
Setting	SP LP	EDIT	EDIT
Function	Recording mode switch	EDIT switch	

27 **BEEP switch** ㉓
Normally set to "ON" to activate the recording start/stop beeps and the warning beeps.
To deactivate the beeps, set the switch to "OFF".

28 **DATA SCREEN button** ㊺

29 **Tape transport buttons** ㊺ ㊻
>/II ► FRAME (forward direction/frame-by-frame in forward direction)
▮► SLOW
□ (stop)
◄◄ REW (rewind)
▷ (playback)
►► FF (fast-forward)
II PAUSE

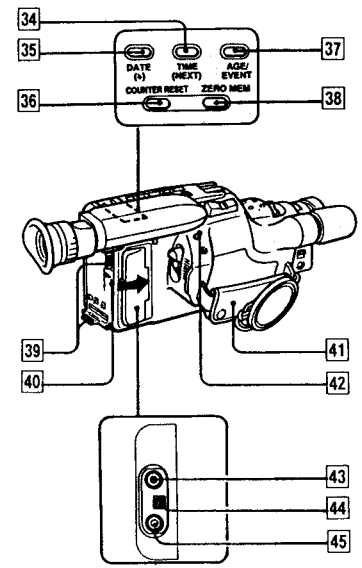
30 **Battery mounting surface** ⑫

31 **STANDBY switch** ㉒
Slide up to set the camcorder to standby mode.

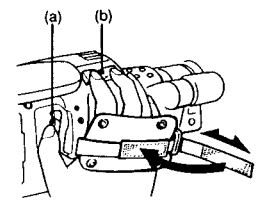
32 **START/STOP button** ㉒
Press to start and stop camera recording.

33 **Ω (earphone) jack (minijack)** ㉘

(A-5)



(A-6)



(A-5)

34 **TIME (NEXT) button** ⑲ ㉕ ㊽

35 **DATE (+) button** ⑲ ㉕ ㊽

36 **COUNTER RESET button** ㉗ ㊾

37 **AGE/EVENT button** ㊾

38 **ZERO MEM (zero memory) button** ㉗ ㊾

39 **Hooks for shoulder strap**

40 **REMOTE COMMANDER ON/OFF switch** ❾
Set to "ON" when using the supplied wireless Remote Commander. When you do not use the Commander, set to "OFF" to keep the unit from being operated incorrectly by another Commander, etc.

41 **Grip belt (A-6)**
Adjust the length so that your thumb and fingers can easily manipulate the START/STOP button (a) and the power zoom button (b).

42 **REMOTE (LANC)*control connector (stereo mini-minijack)**
Connect a wired remote control unit or an editing controller, etc. here.

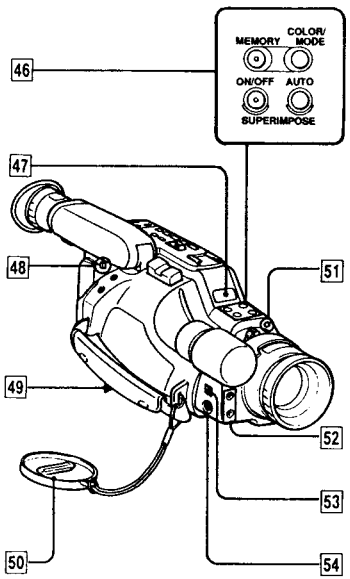
43 **AUDIO OUT (output) jack (phono jack)**

44 **RFU DC OUT (RFU adaptor DC output) jack (special minijack)**
Attach the supplied RFU adaptor here.

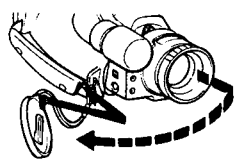
45 **VIDEO OUT (output) jack (phono jack)**

***About the (LANC)**
LANC stands for Local Application Control Bus System. The LANC connector is used for controlling the tape transport of video equipment and peripherals connected to it. This connector has the same function as the connectors indicated as CONTROL L or REMOTE.

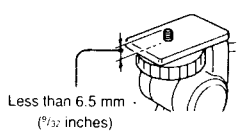
(A-7)



(A-8)



(A-9)



(A-7)

46 **SUPERIMPOSE buttons** ⑫
MEMORY button
COLOR/MODE button
AUTO button
ON/OFF button

47 **Remote sensor** ⑩

48 **PUSH SLIDE (viewfinder positioning) button**
Slide the viewfinder to a suitable position.

49 **Tripod receptacle (bottom)**

50 **Lens cap (A-8)**

51 **Camera recording/battery lamp**

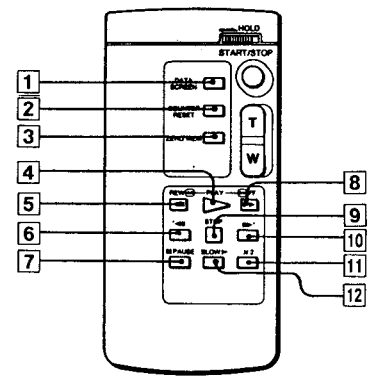
52 **MIC (microphone) jack (minijack) and DC OUT (power output) jack (mini-minijack)**
Connect an external microphone (not supplied).
The MIC jack accepts a "plug-in-power" microphone and the DC OUT jack supplies power to it.

53 **BUILT-IN MIC (microphone) switch** ㉕
Set to "WIND" when recording in a strong wind.

54 REC START/STOP button (for low-position recording) ㉓
Use this button instead of the START/STOP button for easier low-position recording.

Note (A-9)
When attaching a tripod other than Sony's, make sure that the length of the camera mounting screw is less than 6.5mm. Otherwise, the screw may damage the inner parts of the camcorder.

(A-10)



Wireless Remote Commander

You can play back a tape from a distance. The buttons on the Remote Commander with the same name or mark as those on the camcorder have the same function.

When you use the Commander
Be sure to set the REMOTE COMMANDER ON/OFF switch on the camcorder to "ON", and then start operation of the camcorder, with the Commander pointing towards the remote sensor. (See "Remotely controllable area" on page 10.)

(A-10)

1 **DATA SCREEN button** ㉟

2 **COUNTER RESET button** ㉗ ㉞

3 **ZERO MEM (memory) button** ㉗ ㉞

4 ▷ **PLAY (playback) button** ㉟

5 ◀◀ **REW (rewind) button** ㉟, ㊲

6 **</◀II (reverse direction/reverse frame) button*** ㊱

7 **II PAUSE button** ㊱

8 **FF ▶▶ (fast-forward) button** ㉟, ㊲

9 □ **STOP button** ㉟

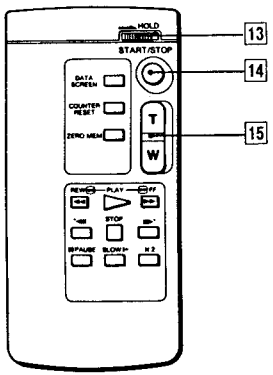
10 **>/II▶ (forward direction/forward frame) button** ㊱

11 **×2 (double speed playback) button*** ㊱

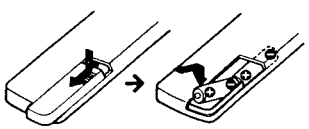
12 **▮▶ SLOW button** ㊱

Note
The * indicates the functions which are operable only with the Commander.

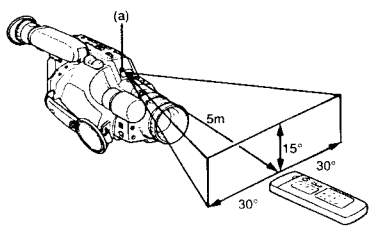
(A-11)



(A-12)



(A-13)



(A-11)

13 **HOLD switch**
Slide in the direction of the arrow to prevent the buttons from being accidentally pressed.

14 **START/STOP button**
Press to start and stop camera recording.

15 **Power zoom button**

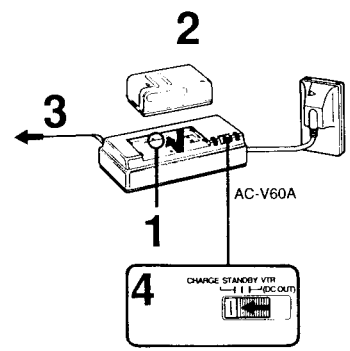
Inserting batteries (A-12)
Insert two R6 (size AA) batteries with polarity positioned correctly.

Remotely controllable area (A-13)
Point the Commander towards the remote sensor (a).

Note on batteries
With normal operation, batteries will last for about six months. However, if the Commander will not be used for a long period, remove the batteries to avoid possible damage from battery leakage.

Notes on the Remote Commander
- Keep the remote sensor away from the strong light source such as direct sunlight or illumination. Remote control with the Commander may not be effective.
- Be sure that there is no obstacle between the remote sensor and Commander.
- The command mode of the Commander is VTR2. Avoid to use the Sony VTRs with the same command mode at the same time.
- Be sure to set REMOTE COMMANDER ON/OFF on the camcorder to OFF when you connect the receiver of a remote control kit (not supplied) to the REMOTE control connector.

(B-1)



Preparing your camcorder 1

Connecting the Power Sources

First, Choose the Power Source.

Place	Power source	Accessory to be used
Outdoors	Battery pack	Battery pack NP-66 (supplied), NP-66H, NP-77H, NP-77 or NP-55
	Alkaline batteries	Battery case EBP-77 or EBP-55
Indoors	House current	AC power adaptor AC-V60A (supplied), AC-V30 or AC-V55
In the car	12V or 24V car battery	DC pack DCP-77, or AC power adaptor AC-V55 and car battery cord DCC-16AE

Note on power sources
Disconnecting the power source or removing the battery pack during recording or playback may damage the inserted tape. In this case supply the power again immediately.

Using the Battery Pack

Step 1

Charge the battery pack. (B-1)

1 Align the groove on the battery pack with that on the AC power adaptor.

2 Slide in the battery pack to the right.

3 Connect the AC power adaptor to a wall outlet.

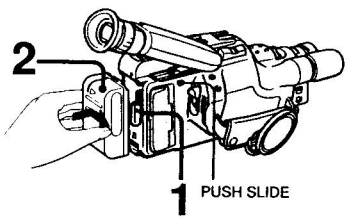
4 Set the CHARGE/VTR selector of the AC power adaptor to CHARGE.
Charging begins.

	NP-66 (supplied)	NP-66H	NP-77H	NP-77	NP-55
Required charging time	80	100	140	120	60

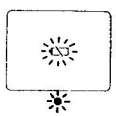
(approx. minutes using AC-V60A)

See the instruction manual of the AC power adaptor for details.

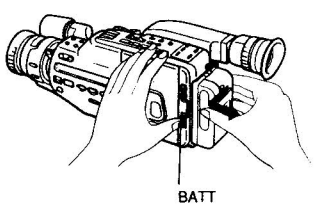
(B-2)



(B-3)



(B-4)



Step 2

Mount the battery pack on the camcorder.
(B-2)

1 Align the right side of the battery pack with the line on the camcorder.

2 Slide in the battery pack to the right.
Notes:

- Make sure the battery fits completely on the mounting surface of the camcorder. Imperfect fit may damage the projections on the camcorder.
- If your nose touches the battery pack, adjust the position of the viewfinder by sliding it while pressing PUSH SLIDE.

Battery life
A fully charged battery pack lasts for:

	NP-66 (supplied)	NP-66H	NP-77H	NP-77	NP-55
Battery life	70	85	110	90	50

(approx. minutes, continuous recording indoors)

When the battery becomes weak, the indication and red lamp blink in the viewfinder. **(B-3)** Also the camera recording/battery lamps on the camcorder blink. Replace the battery pack with a fully charged one.

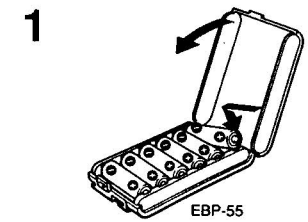
To remove the battery pack (B-4)
Slide BATT up, and slide out the battery pack to the left.

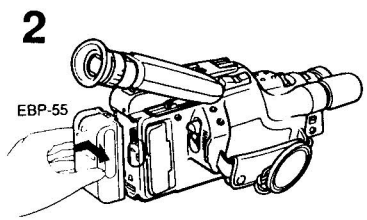
Other options for charging

- AC-V55 AC power adaptor:
  You can charge two battery packs simultaneously.
- DC-V30 car battery charger:
  You can charge a battery pack by connecting the car battery charger to the cigarette lighter socket. This battery charger also supplies power to Sony 8 mm equipment that operates on a battery pack.

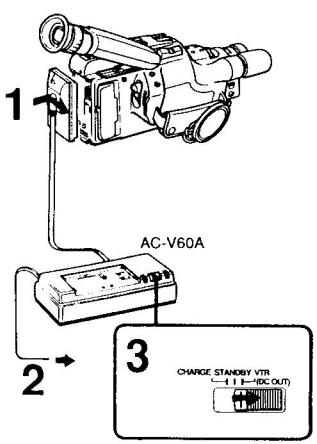
If you have an NP-4000
You can use it for long outdoor recording.

(B-5)





(B-6)



Using Alkaline Batteries

(B-5)
The EBP-55 or EBP-77 battery case (not supplied) is required .

1 Insert the R6 alkaline batteries into the battery case.
(12 batteries for EBP-77 and 6 batteries for EBP-55)

2 Attach the case in the same way as the battery pack.

Battery life (when using Sony alkaline batteries)

	EBP-77	EBP-55
Battery life	120	45

(approx. minutes, continuous recording indoors)

To remove the battery case
Remove it in the same way as you do with the battery pack.
See page 12.

Notes on battery life

- Batteries will not last as long in cold places.
- No indication appears in the viewfinder to warn of a weak battery.

Using House Current

(B-6)
Use the supplied AC-V60A AC power adaptor.

1 Align the right side of the connecting plate with the line on the camcorder, and slide it in to the right.

2 Connect the AC power adaptor to a wall outlet.

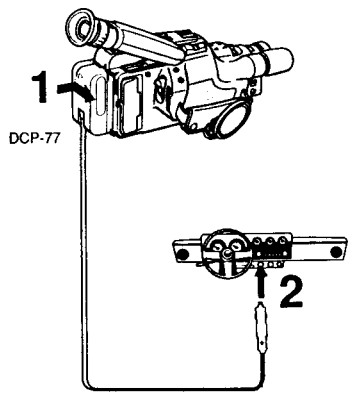
3 Set the CHARGE/VTR selector of the AC power adaptor to VTR.

See the instruction manual of the AC power adaptor for details.

To remove the connecting plate
Remove it in the same way as you do with the battery pack.
See page 12.

Other options
The AC-V30 or AC-V55 AC power adaptor can also be used.

(B-7)



Using Car Battery

(B-7)
The DCP-77 DC pack is required (not supplied).

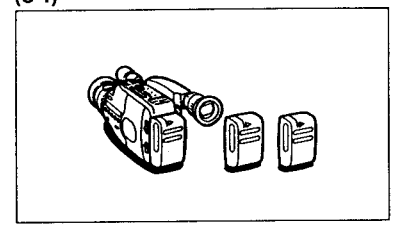
1 Align the right side of the DC pack with the line on the camcorder, and slide it in to the right.

2 Connect the cord of the DC pack to the cigarette lighter socket of a car (12 V or 24 V).

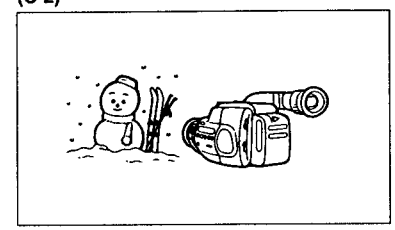
To remove the DC pack
While pressing the BATT knob on the camcorder, slide the DC pack to the left and pull out.

Other options
- The AC-V55 AC power adaptor and the DCC-16AE car battery cord can also be used to operate this camcorder on a 12 V or 24 V car battery.
- The DCP-55 DC pack can also be used to operate this camcorder on a 12V or 24V car battery.

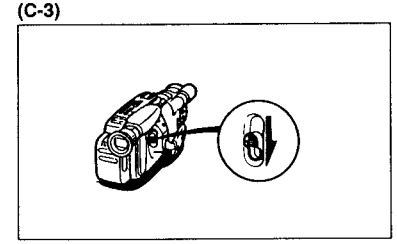
(C-1)



(C-2)



(C-3)



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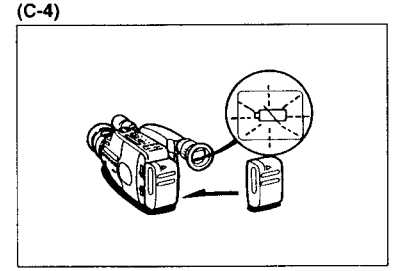


Using the Best of the Battery Pack

How to Prepare the Rechargeable Battery Pack

Have sufficient battery pack power to do 2 or 3 times as much recording than you have planned. (C-1)
"Battery life" as indicated in the instruction manual or catalogue of the camcorder is measured by the continuous recording time of the camcorder, placed at a room temperature using a full-charged battery.

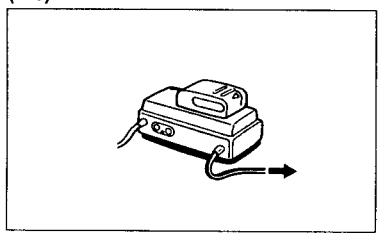
Battery life is shorter in a cold climate. (C-2)
Battery efficiency is decreased and the battery will be used up more quickly.

Turn the STANDBY switch of the camcorder off when not recording to save battery power. A smooth recording can be made even if recording is stopped and started again. (C-3)
While positioning the subject or selecting an angle, or looking through the viewfinder lens, the lens moves automatically and the battery is used. The battery is also used when a tape is inserted or removed.

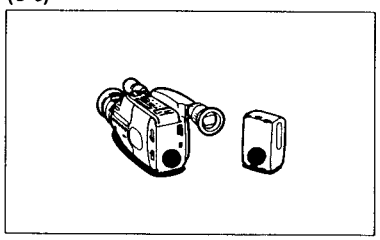
When the Rechargeable Battery Pack Should Be Replaced

When the ⌧ mark and red lamp in the viewfinder change from slow blinking to rapid blinking while you are recording, (C-4)
Turn off the power switch of the camcorder and replace the battery pack. Leave the tape in the camcorder in order to obtain a smooth recording after the battery pack is replaced.

(C-5)



(C-6)



Notes on Charging

Before using the battery pack, charge it sufficiently. A brand new battery pack is not charged.

Recharge the battery pack only when it is exhausted. (C-5)

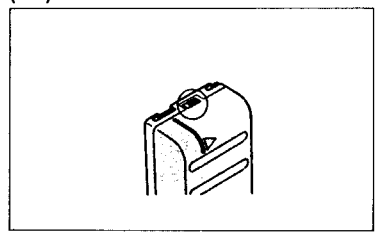
- If recording is completed before the ⌧ mark appears in the viewfinder, it is recommended that you remove the tape, set POWER to CAMERA, slide up STANDBY, and leave the camcorder until the ⌧ mark blinks rapidly.
- Repeated charging while some capacity remains causes a lowering of battery capacity. However, **the original battery capacity can be recovered if you fully discharge and charge the battery again.**

Recharge the battery pack before using.
If the battery pack is charged fully but not used for a long time (about 1 year), it becomes discharged.
Charge it again but in this case the battery life will be shortened than normal. After several charging and discharging cycles, the battery life will recover its original capacity.

Keep the Terminals Clean

If the terminals (metal parts on the back) are not clean, the battery duration will be shortened. (C-6)
When the terminals are not clean or when the battery pack has not been used for a long time, install and remove the battery pack from time to time. This will improve the contact condition.
Also, wipe the + and – terminals with a soft cloth or paper.

(C-7)



Notes on the Rechargeable Battery Pack

Why the battery pack heats up?
During charging or recording, the battery pack heats up. This means energy has been generated and chemical change has occurred inside the battery pack and this is not dangerous.

How to care for the battery pack

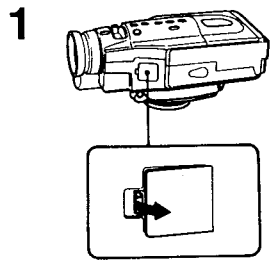
- Remove the battery pack from the camcorder after using it, and keep it in a cool place. When the battery pack is attached to the camcorder, a small amount of current flows to the camcorder even if the POWER switch is turned off. It causes overdischarging and shortens battery life.
- The battery pack is always discharging even when it is not in use after charging. Thus, it is recommended you charge the battery before using.

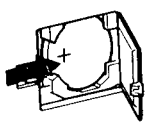
How to use the switch on the battery pack (C-7)
This switch is provided so that you can remember the charging condition. Set the switch to the "no mark" position when charging is completed. Set the switch to the "red mark" position when the battery is used up.

How many times can the battery pack be recharged ?
It can be fully charged and discharged about 500 times under normal temperatures.
If the ⌧ mark blinks rapidly just after turning on the camcorder with a fully charged battery pack, the battery pack should be replaced with a new fully charged one.

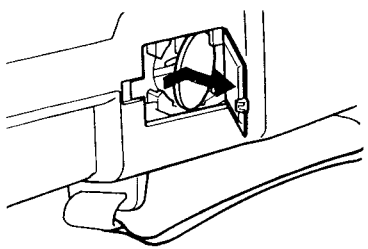
Temperatures during charging
Lower temperatures require a longer charging time. Charging under temperatures ranging from 10°C to 30°C is recommended.

(D-1)

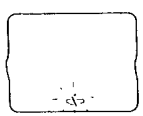




(D-2)



(D-3)



Preparing your camcorder 2

Setting the Date and Time

Inserting the Lithium Battery

(D-1)

This camcorder uses a lithium battery to activate the clock and to keep a title and birth dates in camcorder's memory. Before operating it for the first time, install the supplied lithium battery.

1 Open the cover of the lithium battery compartment on the bottom.

2 Install the supplied CR2025 lithium battery with the + side facing out.

3 Close the cover.

To remove the lithium battery (D-2)

Press the side of the battery in the direction as indicated for installation.

Note on lithium battery life

The battery will last for approximately 1 year in normal operation.

When the lithium battery becomes weak, the ⚠ indication will blink on the viewfinder screen for about 5 seconds (when POWER is set to CAMERA) (D-3). In this case, **replace the battery with a Sony CR2025.**

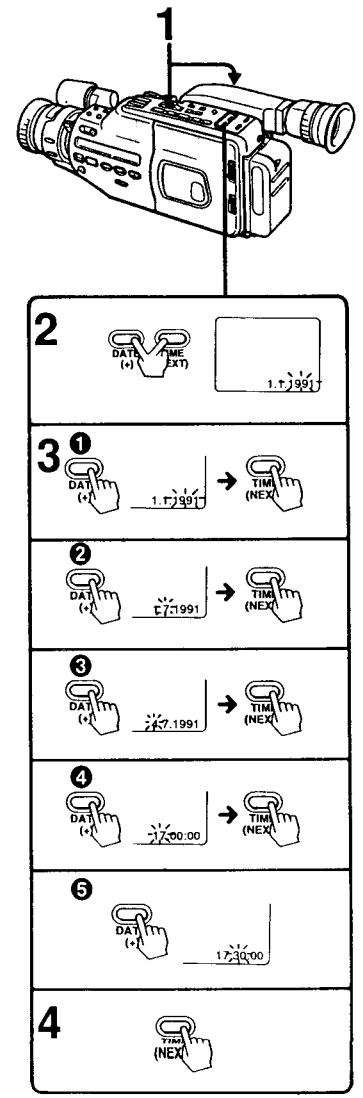
Use of any other battery may present a risk of fire or explosion.

While replacing the lithium battery, keep the battery pack or other power source attached. Otherwise, readjustments of the date, time, title and birth dates are necessary.

Cautions

- Keep the lithium battery out of the reach of children. Should the battery be swallowed, immediately consult a doctor.
- Wipe the battery with a dry cloth to assure a good contact.
- Be sure to observe the correct polarity when installing the battery.
- Do not hold the battery with metallic tweezers, otherwise a short-circuit may occur.
- Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

(D-4)



Setting the Date and Time

(D-4)

Make sure that a power source and lithium battery are attached.

1 Set POWER to CAMERA, and slide STANDBY up.

2 Press DATE (+) and TIME (NEXT) simultaneously for more than one and a half seconds until the date indication appears in the viewfinder.

DATE now functions as + (to advance numbers) and TIME functions as NEXT (to execute).

3 Adjust the year, month, day, hour and minute, in that order.

First adjust the blinking digits with +, and then press NEXT.

- When you keep DATE (+) pressed, the digits advance faster.
- The year starts at 1991, and proceeds as follows:

1991 ---> 1999 → 2000 ---> 2020

4 Press NEXT to set the second.

The clock starts operating.

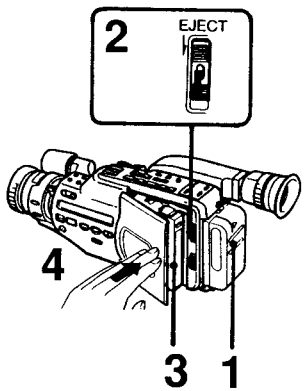
To correct date and time setting

Repeat steps 2 to 4.

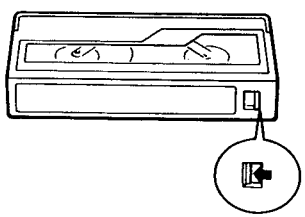
To check the preset date and time

Press DATE or TIME. When you press the same button again, the indication goes off.

(E-1)



(E-2)



Inserting a Tape

Inserting a Tape

(E-1)

1 Make sure that a power source is connected.

2 While pressing the small blue button, push EJECT in the direction of the arrow.
The cassette holder opens.

3 Insert a tape with the window facing outside.

4 Press the PUSH mark to close the cassette holder.

Ejecting the Tape

1 Make sure that a power source is connected.
2 While pressing the small blue button, push EJECT in the direction of the arrow.
3 Take out the tape and press the PUSH mark to close the cassette holder.

Preventing Accidental Erasure

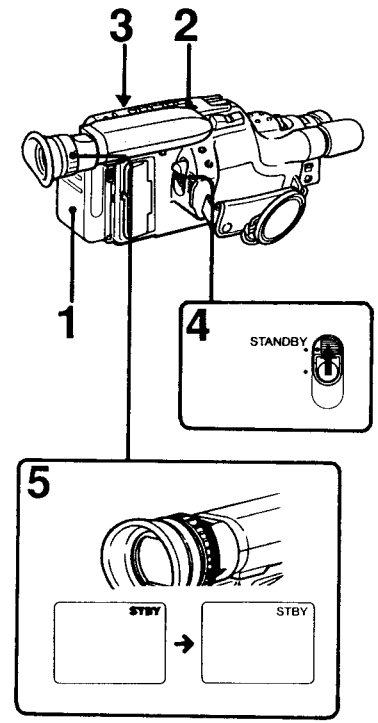
(E-2)

Slide the tab on the cassette to expose the red mark. This will prevent accidental recording.
To re-record on this tape, slide the tab back out covering the red mark.
If you try to record with the red mark exposed, the ⌧ and ⏏ indications blink in the viewfinder and beeps sound for about 5 seconds.

Notes on handling tapes

- Never insert anything in the small holes on the rear of the cassette. These holes are used to sense the type of tape, thickness of tape, or if red mark is exposed or coverd, etc.
- Store tapes in their cases and keep them in an upright position to prevent intrusion of dust and uneven winding.

(F)



Adjusting the Viewfinder Lens

The position of the viewfinder lens for optimum vision varies depending on the person. Adjust when using for the first time, or when using after someone else. (F)

1 Make sure a power source is connected.

2 While pressing the green button, set POWER to CAMERA.

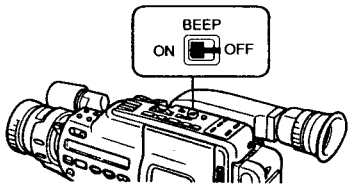
3 Insert a cassette.

4 Slide STANDBY up.

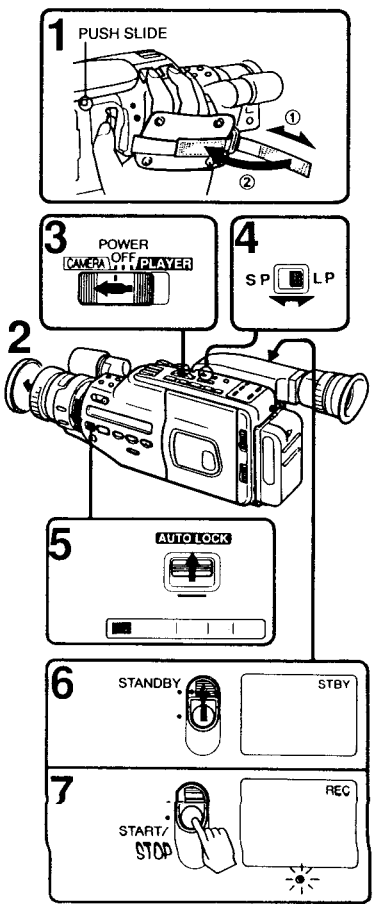
5 Turn the viewfinder lens adjustment ring so that the "STBY" displayed on the viewfinder screen comes into sharp focus.

Recording a Picture Using Automatic Adjustments

(G-1)



(G-2)



Before recording "once-only" events, we strongly recommend making a trial recording and checking that everything is working perfectly.

Start Recording.

Make sure BEEP is set to ON. Beep will sound when you start and stop recording. **(G-1)**

(G-2)

1 **Hold the camcorder as in the figure.**
(Put your hand through the grip belt and make sure that your finger can easily touch START/STOP.)
If your nose touches the camcorder, press PUSH SLIDE and adjust the position and angle of the viewfinder.

2 **Remove the lens cap and attach it to the grip strap.**

3 **While pressing the green button, set POWER to CAMERA.**

4 **Set REC MODE to LP (long play) or SP (standard play), according to the length of your planned recording.**

5 **Set AUTO LOCK to the green position and turn the zoom lever downwards.**

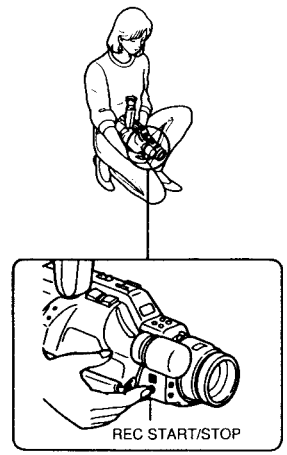
6 **Slide STANDBY up.**
"STBY" appears in the viewfinder. The camcorder is now in standby mode.
Focus is adjusted automatically. Do not turn or stop the focus ring forcibly.

7 **Press START/STOP.**
A beep sounds. "REC" appears and the red lamp lights up in the viewfinder and the camera recording/battery lamps light on the camcorder. The camcorder is now recording.

To standby (to stop momentarily)
Press START/STOP again.
Two beeps sound and "STBY" appears in the viewfinder.

To stop
Slide STANDBY down and set POWER to OFF.

(G-3)



For low-position recording (G-3)
The viewfinder can be turned 90 degrees up.
Press REC START/STOP in front of the camcorder.
To stop recording, press it again.

About the sports finder
This camcorder is equipped with the sports finder. As the focul length of this finder is long, you can monitor the picture while being away from the eyecup.

Using the BEEP switch
Normally set BEEP to ON.
It beeps when you start and stop recording, and if any difficulty should arise during operation.
If you want to deactivate the beeps, set BEEP to OFF.

Notes
- Beeps are not recorded on the tape.
- For warning beeps, see the back cover.

If the tape reaches near the end during recording
The ⌧ indication in the viewfinder and the camera recording/battery lamps on the camcorder blink slowly.
When the tape reaches its end, blinking becomes rapid and beeps sound for about 5 seconds (if BEEP is set to ON).

Notes on recording
- To record from the beginning of the tape, run the beginning of the tape for about 15 seconds before recording. This will avoid missing the starting point when the tape is played back.
- When moving from indoors to outdoors, or vice versa, slide STANDBY up and point the camcorder at a white object for about 10 seconds so that the white balance is properly adjusted.

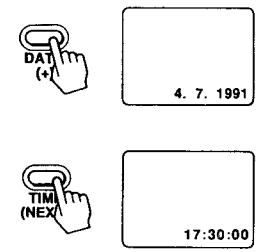
Note on standby
If you leave the camcorder in standby mode for 5 minutes or more, the camcorder will be automatically turned off. To resume standby mode, slide STANDBY down once and slide it up again.

Note on light sources
If you are shooting a subject in bright conditions just after shooting in a dark place, the picture may not appear in the viewfinder. In this case, point the camcorder to the other direction.

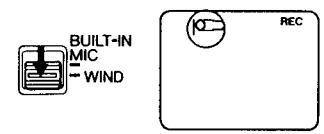
Recording mode
An 8 mm video format cassette records in the SP (standard play) mode and in the LP (long play) mode and can play back in the SP mode and LP mode.
The quality of the recording picture in the LP mode, however, will not be as good as that in the SP mode.

Note on PCM recording and playback
PCM recording or playback is not possible with this camcorder.
The PCM sound recorded or after-recorded with another video recorder cannot be played back with this camcorder.

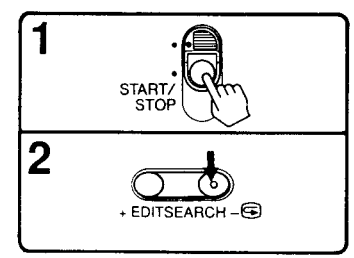
(G-4)



(G-5)



(G-6)



To Record the Date or Time

(G-4)

During camera recording or when in standby mode, press DATE for date indication or TIME for time indication.
The date or time displayed in the viewfinder is recorded with the picture.

To stop recording date or time
Press DATE or TIME again.
The picture recording continues.

When There is a Strong Wind

(G-5)

Set BUILT-IN MIC to WIND.
The noise from the wind will reduce.
After recording, set it to the upper position (green mark).

To Check the Last Portion of the Previous Recording

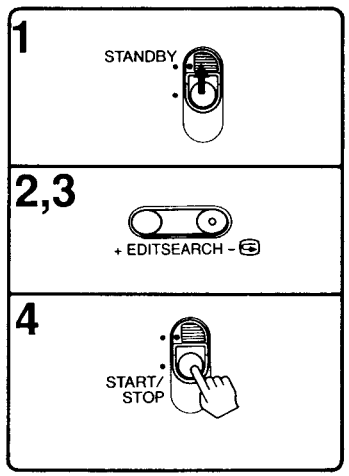
(G-6)

1 **Set the camcorder in standby mode by pressing the START/STOP button.**

2 **Press the – side of EDITSEARCH (⏪) momentarily.**
The last few seconds of the recorded portion are rewound and then the recorded picture appears in the viewfinder. After a few seconds of playback, the camcorder goes back to standby mode.

If the picture has not been recorded
The video heads may be contaminated. Clean the heads using the Sony V8-25CLH video head cleaning cassette or equivalent.

(G-7)



To Re-record on a Previously Recorded Portion during Recording

(G-7)

1 Slide STANDBY up.

2 Look in the viewfinder and find the point from where you want to begin the recording:
Keep pressing the + side of EDITSEARCH to advance the picture at a normal playback speed, or the – side to reverse the picture.

3 At the desired point, release EDITSEARCH.

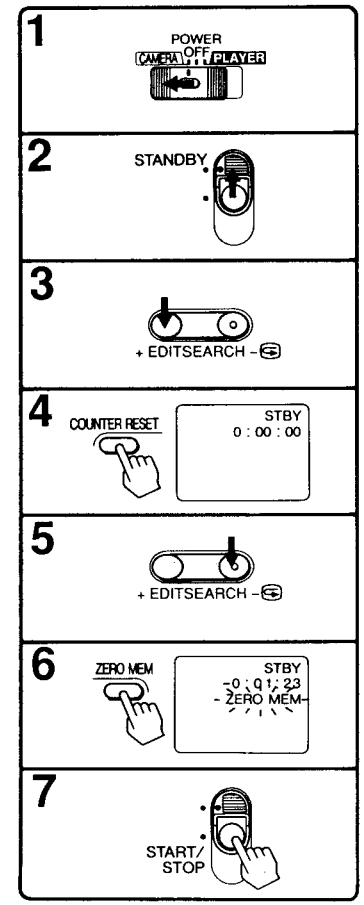
4 Press START/STOP.
A beep sounds and the recording begins.

To pause
Press START/STOP again.

To stop
Slide STANDBY down.

A smooth transition between scenes can be made even if STANDBY is slid down and slid up, or even if the power is turned off and on again, provided that the tape is not removed.

(G-8)



To Re-record a Picture in the Middle of a Recorded Tape (Insert Recording)

(G-8)

1 While pressing the green button, set POWER to CAMERA.

2 Slide STANDBY up to set the camcorder to standby mode.

3 While looking in the viewfinder, keep pressing the + or – side of EDITSEARCH and release the button where you want to end the insertion.
The camcorder is set to standby mode.

4 Press COUNTER RESET.
The counter is reset to zero.

5 While looking in the viewfinder, keep pressing the – side of EDITSEARCH and release the button at the point where you want to start the insertion.

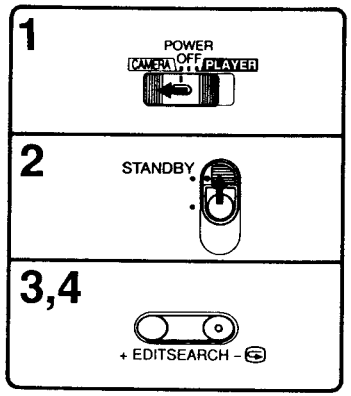
6 Press ZERO MEM.
The insert ending point is stored in memory.

7 Press START/STOP.
A beep sounds and insert recording begins. The insert recording stops automatically near the counter zero point.

To cancel the ZERO MEM
Press ZERO MEM.

Note
The picture may be distorted at the ending point when played back.

(G-9)



Playing Back Your Picture Instantly

(G-9)

You can check the recorded picture in the viewfinder. However, you cannot monitor the sound.

1 While pressing the green button, set POWER to CAMERA.

2 Slide STANDBY up.

3 Keep pressing the – side of EDITSEARCH to view the playback picture in reverse.

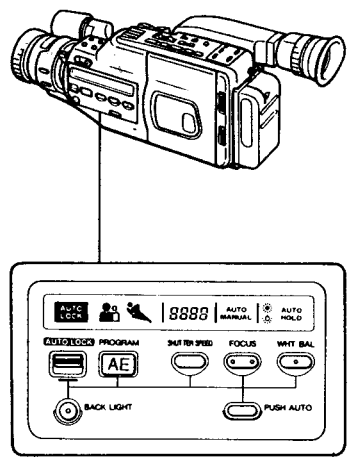
4 Keep pressing the + side of EDITSEARCH to view the playback picture.

To stop playback, release EDITSEARCH.

To monitor the sound while viewing the playback picture in the viewfinder

1. Connect an earphone to the ● jack.
2. While pressing the green button, set POWER to PLAYER.
3. Press ◀◀ to rewind the tape and press □ where you want to stop.
4. Press ▷ to start playback.

(H)



Selecting the Automatic/ Manual Adjustment

When you set AUTO LOCK to the green position, focus, white balance, and iris are adjusted automatically and the shutter speed is set to 1/50. The automatic function offers you worry-free operation under most shooting conditions. But under certain circumstances, manual adjustment is better for effective recording. For manual adjustment, set AUTO LOCK to the lower position and select an appropriate setting. **(H)**

To adjust each item manually, see the page as shown in the table.

Item	See page
Focus	30, 31
White balance	32, 33
Shutter speed	34
Iris	35

PROGRAM AE function:
In addition to the above items, when you use the PROGRAM AE (Auto Exposure) function under the manual mode, you can get a scene like a portrait or clear picture in the still and slow motion playback. (See pages 36 and 37.)

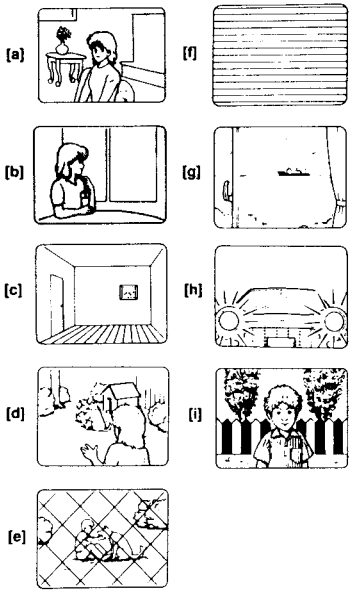
Push Auto:
During recording with manual focusing, as long as you keep this button pressed, autofocusing is activated.

When you attach the battery at the first time
The white balance, focus and iris are automatically adjusted and the shutter speed is set to normal speed (1/50) regardless of the position of AUTO LOCK.

Notes

- As long as you do not remove the battery, even if you set POWER to OFF, the previous settings are stored.
- If you set AUTO LOCK to the green position after you have made a manual adjustment and reset it to the lower position, the previous settings for manual adjustment will be later recalled.

(I-1)



Manual Focusing

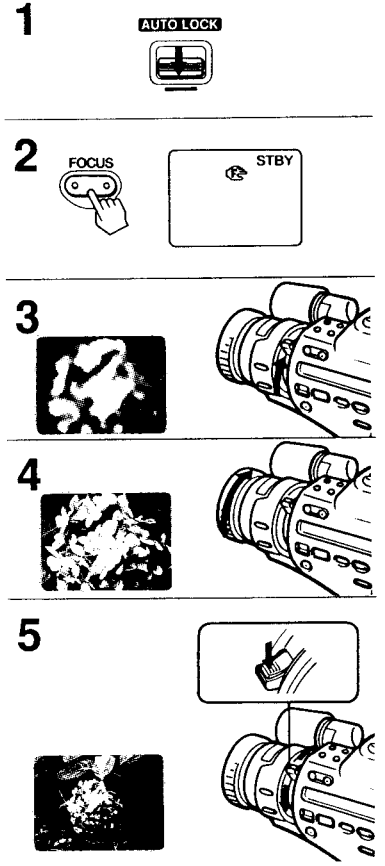
When you set AUTO LOCK to the green position and set the subject to the center of the viewfinder, the autofocusing functions and you can easily get a focused picture under most shooting conditions. But manual focusing is recommended in the following cases.
[a] to [i] correspond to the illustrations. **(I-1)**

[a] Insufficient light
[b] Too much brightness behind the subject
[c] Subjects with little contrast–wall, sky, etc.
[d] One subject is close; the other is in the center, but at a distance
[e] Subjects beyond nets, etc. or another subject passes in front of the camcorder
[f] Horizontal stripes
[g] Subject through frosted glass
[h] Bright subject or subject reflecting light
[i] High contrast behind the subject (The background may be focused.)
[j] Under the following circumstances
- When you use conversion lenses or effect filters
- When shooting a stationary subject using a tripod
- To save battery wear

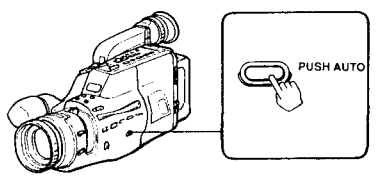
Autofocusing does not function momentarily when:
- The setting of the shutter speed is changed.
- Backlight is adjusted manually.
- Lighting conditions change quickly.
- Zooming is changed from wide-range to telephoto.

This camcorder keeps in focus by referring to the picture contrast, which is weak in the above situations.

(I-2)



(I-3)



Focusing Manually

(I-2)

1 **Set AUTO LOCK to the lower position.**

2 **Press FOCUS.**
Make sure the (manual focusing) indication appears in the viewfinder. If it does not appear, press the button again.

3 **Turn the manual zoom lever fully to the telephoto position.**

4 **Turn the focus ring to achieve sharp focus.**

5 **Set the desired shot length using the manual zoom lever, while pressing the gray button on it.**

Shooting with autofocusing momentarily

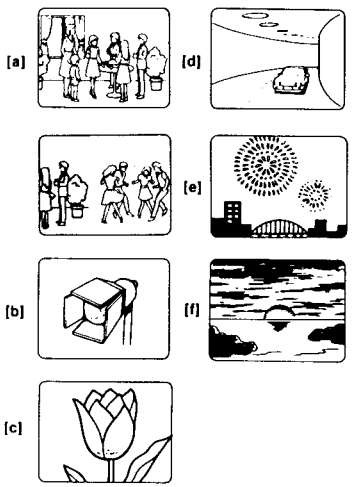
(I-3)

While shooting with manual focusing, press PUSH AUTO. The autofocusing functions while you are pressing the button. When you release the button, manual focusing will be resumed. Use this button when you change the focus from one subject to another. The focusing performs naturally.
The previous settings except for focusing are retained.

Some helpful hints
- When shooting in relatively dark places such as indoors, the depth of field in proper focus is very shallow. For best results, shoot at wide angles after focusing in telephoto.
- When shooting a scene with lots of movement in bright light, set the zoom lever to the wide-angle position and the focus ring to 2 to 3 m.

Adjusting the White Balance

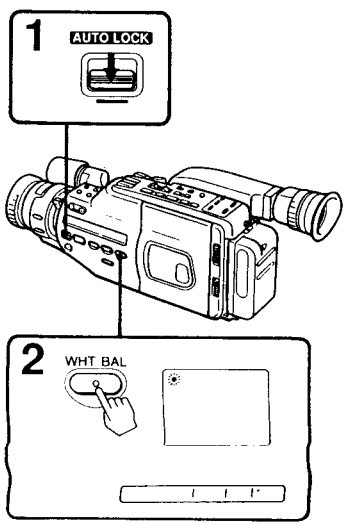
(J-1)



When you set AUTO LOCK to the green position, the auto white balance function of this camcorder adjusts the picture to natural colours under most shooting conditions. However, in the conditions listed below, adjust the white balance manually.
[a] to [f] correspond to the illustrations. **(J-1)**

	Conditions	Indication in the viewfinder
[a]	Lighting conditions change quickly	☼
[b]	Too bright, such as in photograph studios	☼
[c]	Monochromatic subject or background	HOLD
[d]	Under a sodium lamp	☼
	Under a mercury lamp	
	Under a colour matching fluorescent lamp	☀
[e]	Recording outdoors: a night view, neon signs or fireworks	
[f]	Recording outdoors: scenes after sunset or before sunrise	

(J-2)



Adjusting the White Balance Manually

(J-2)

1 Set AUTO LOCK to the lower position.

2 Select the desired white balance mode by pressing WHT BAL.
Each time you press the button, the indication changes as follows.

→ No indication → HOLD → ☀ → ☼ →

Note on manual adjustment
When moving from indoors to outdoors, or vice versa, set AUTO LOCK to the green position and then reset to the lower position again.

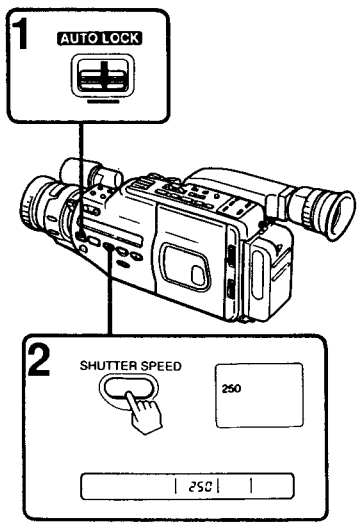
What is the HOLD mode?
In the HOLD mode, the camcorder automatically adjusts to the colour temperature of the subject's light source and keeps that temperature during recording. When recording some subjects with different colour temperatures, use the HOLD mode to set a colour temperature and you can achieve a recording with natural colours without being affected by the surroundings.

To set into the HOLD mode
1 Set AUTO LOCK to the lower position and press WHT BAL to set to Auto (no indication).
2 Point at and record a white, flat object such as a white wall, or paper.
3 Press WHT BAL.
The HOLD mark appears in the viewfinder.

When you change the battery pack or the light source is changed, you need to set into the HOLD mode again. In this case, follow the procedures above again.

(K-1)

(K-2)



Setting Shutter Speed

(K-1)
When you record a fast-moving subject, increase the shutter speed so that you can see the clear picture in the playback pause mode.
Also, the depth of field in proper focus becomes shallow at a high shutter speed. This is effective to record the main subject in sharp focus and the surroundings of focus.
When recording at a high-speed shutter setting, record in a brighter place than usual.

Recommended setting for your situation

Example use	Recommended shutter speed
• On clear days, recording golf or tennis swing (To view the hit ball clearly in the still picture mode, set to 1/4000.) • Recording skiers	1/4000 or 1/2000
• On overcast days, recording a moving merry-go-round or roller coaster • Recording outdoors from inside a vehicle (for stable shooting)	1/1000 or 1/250
• Instead of the ND2 filter (To reduce the exposure level to about a half) • Recording indoor sports (for stable shooting)	1/120

Selecting the Shutter Speed

(K-2)

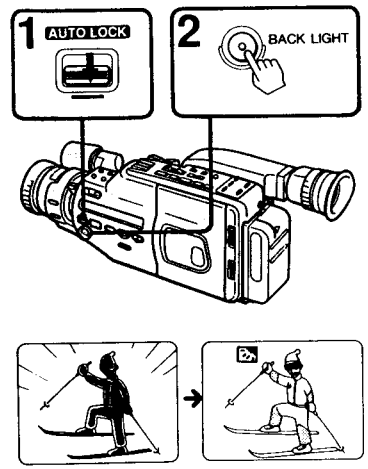
1 Set AUTO LOCK to the lower position.

2 Press SHUTTER SPEED repeatedly until the desired shutter speed indication appears.
Each time you press the button, the indication changes as follows.

→ No indication (1/50) → 120 (1/120) → 250 (1/250) →
4000 (1/4000) ← 2000(1/2000) ← 1000(1/1000) ←

Notes
- When you select shutter speed 1/250 or faster, record under sunlight or use a video light.
- When you shoot a very bright subject at a faster shutter speed, a light vertical, belt-like line ("smear") may appear on the screen.
- When you record at certain shutter speeds under a light discharged tube, such as a fluorescent lamp, sodium lamp or mercury lamp, the brightness of the recorded picture may vary.

(L)



Shooting with Backlighting

In this camcorder, the iris is automatically controlled. However, when shooting a subject that is backlit, that is, if the light source is coming in from the back of the subject, use the BACK LIGHT button. (L)

1 Set AUTO LOCK to the lower position.

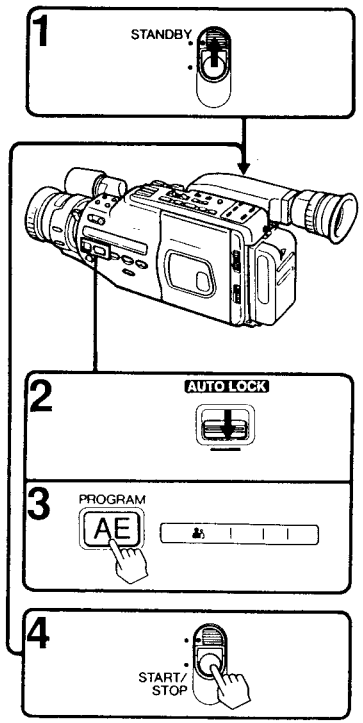
2 Press BACK LIGHT.
The ▷ indication appears. If it does not appear, press the button again.

After shooting, be sure to release this adjustment condition by pressing BACK LIGHT again. (The ▷ indication goes out.)
Otherwise, the recorded picture will become too bright.

Using the PROGRAM AE button

(M-1)

(M-2)



Using the Portrait Mode

(M-1)

In the portrait mode, the object is in focus and the background is out of focus. The opening of the iris and the shutter speed is automatically adjusted to maintain the appropriate exposure according to the size and brightness of the object. The portrait mode is most effective to be used outdoors.

Use the portrait mode when shooting the following subjects:

- a still subject such as person or flower
- zooming in a subject in the telephoto mode
- subjects beyond obstacles such as net

How to set to portrait mode (M-2)

1 Slide STANDBY up.

2 Set AUTO LOCK to the lower position.

3 Press PROGRAM AE until appears in the display window and the viewfinder.

4 Press START/STOP.
Recording with the portrait mode starts.

To resume the automatic mode

Press PROGRAM AE until neither nor appears in the display window and the viewfinder or set AUTO LOCK to the green position.

Hint for effective camera work

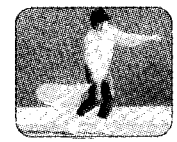
Use of the portrait mode in the following method will gradually bring the background out of focus while keeping the object in focus.

1 Enter the portrait mode.
2 Set AUTO LOCK to the green position and start recording.
3 Set AUTO LOCK to the lower position. The camcorder will enter the portrait mode and brings the background out of focus.

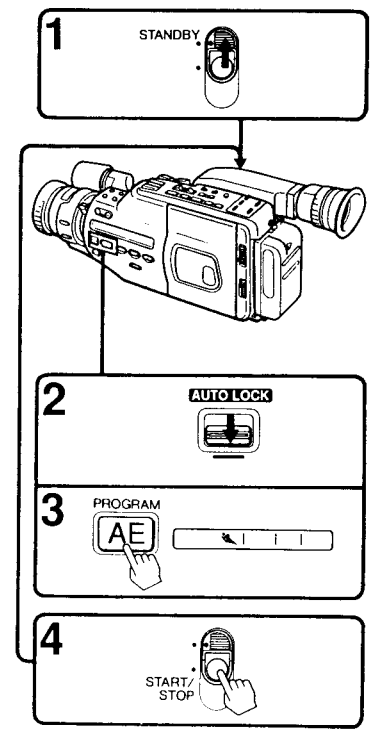
Note

When recording under fluorescent, sodium, or mercury lamp, the brightness of the recorded picture may flicker, or the colour of the recorded picture may become unnatural.

(M-3)



(M-4)



Using the Sports Mode

(M-3)

In the sports mode, the shutter speed and the opening of the iris are automatically adjusted to maintain the appropriate exposure according to the speed of the object. An object moving in high speed can be recorded and the picture can be observed more clearly with less picture shaking in the still or slow mode. The sports mode provides more effective recording than you can achieve by using SHUTTER SPEED.

You may want to use the sports mode when shooting the following subjects:

- outdoor sports scene such as football, tennis, or golf
- recording a landscape in the running car

How to set to sports mode (M-4)

1 Slide STANDBY up.

2 Set AUTO LOCK to the lower position.

3 Press PROGRAM AE until appears in the display window and the viewfinder.

4 Press START/STOP.
Recording with the sports mode starts.

To resume the automatic mode

Press PROGRAM AE until neither nor appears in the display window and the viewfinder or set AUTO LOCK to the green position.

Hint for effective camera work

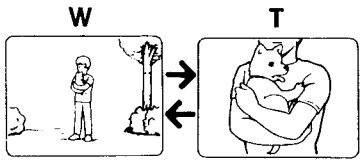
When shooting athletic matches from a distant, such as a football game, we tend to zoom from the wide to the telephoto position to catch the once-only events. Even under these circumstances, by using the sports mode, a sharp picture can be obtained when played back later in the slow or still mode.

Notes

- The sports mode is effective under sufficient lighting, such as under sunlight. When used under extremely dark conditions, the shutter speed may not be shifted to high speeds.
- When recording under fluorescent, sodium, or mercury lamp, the brightness of the recorded picture may vary, or the colour of the recorded picture may become unnatural.

Zooming

(N-1)



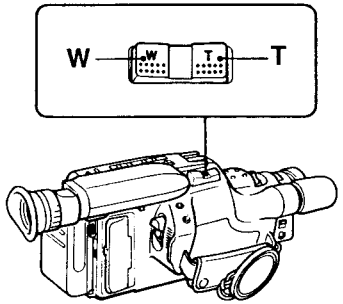
The size of the subject in the scene can be changed. Use "zoom-in" for dramatic close-ups. Use "zoom-out" for panoramic long shots. Also use zooming to focus manually or to decide the shooting angle. **(N-1)**

Power Zooming

— for smooth and constant zooming (N-2)

Press the T side of the power zoom button for telephoto (subject appears closer) and the W side for wide-angle (subject appears farther away).

(N-2)



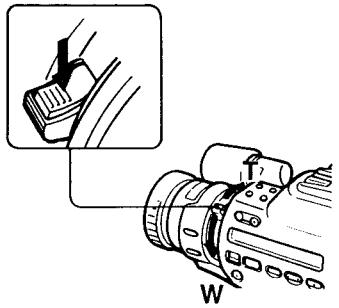
Zooming Manually

— for creating a dramatic effect (N-3)

Turn the manual zoom lever upward for telephoto and downward for wide-angle.

Be sure to keep pressing the button on the lever when turning it downward.

(N-3)

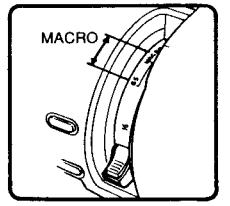


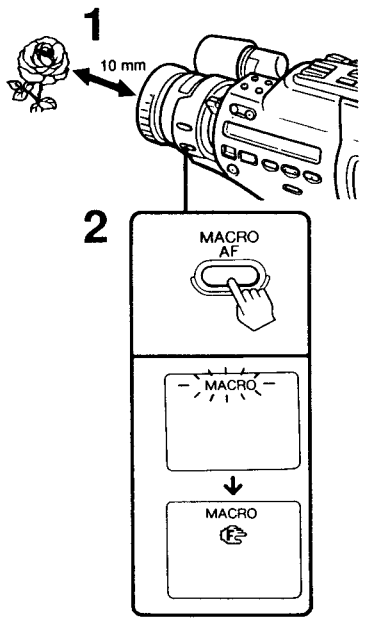
Focal length of this camcorder
The focal length is 8.5 mm to 68 mm. This means approximately 46 mm to 368 mm converted into the focal length of a 35-mm still camera.

When shooting with autofocusing
When you set the zoom lever to the wide angle position, the focus ring will be fixed around the 2 m position and may not exactly match the actual object-to-camera distance.

Close-up (Autofocusing in Macro)

(O-1)





Even small subjects, such as flowers, insects, images in photographs, can literally fill the screen with autofocusing in macro. **(O-1)**

1 Bring the camcorder as close as necessary to obtain the desired subject size.
The subject can be as close as a minimum of 10 mm from the lens surface.

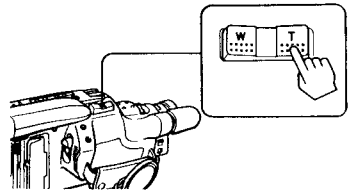
2 Press MACRO AF.
(1) The MACRO indication blinks in the viewfinder and the zoom lever turns automatically to the MACRO range.
(2) The MACRO indication lights steadily and the (F) indication appears when sharp focus is achieved automatically.

To release this adjustment setting
Press the T side of the power zoom button or return the zoom lever to the ordinary range. **(O-2)**

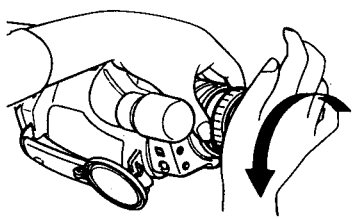
If the MACRO indication lights steadily before getting sharp focus
The MACRO indication lights steadily if you cannot get sharp focus within 30 seconds. In this case, press MACRO AF again to re-function autofocusing in macro.
If you still do not get a sharp focus, manual focusing is recommended (page 31). Adjust it after the MACRO indication lights steadily.

To keep autofocusing active
Keep MACRO AF pressed.
Contrary to the normal autofocusing (page 22), autofocusing in macro is released each time the sharp focus is achieved.

(O-2)



(O-3)



Notes

- This function has no connection with the AUTO LOCK switch. You can use autofocusing in macro while manually adjusting the ordinary focus, etc.
- Do not press the power zoom button while the zoom lever is moving for autofocusing in macro. Otherwise, autofocusing is released.

Manual focusing in macro

1 Turn the zoom lever to the MACRO range without pressing the button on it.
The MACRO indication lights up in the viewfinder.
2 Turn the zoom lever within the MACRO range to focus sharply.

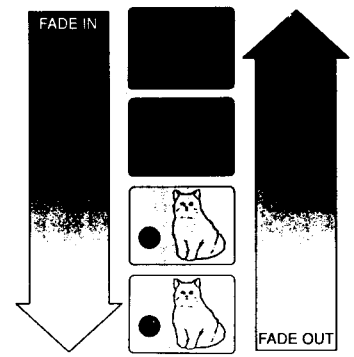
If the lens hood touches the subject

Remove the lens hood.
Hold the focus ring and turn the hood by pressing it with your palm. **(O-3)**
Do the same when attaching/removing an optional filter or conversion lens.

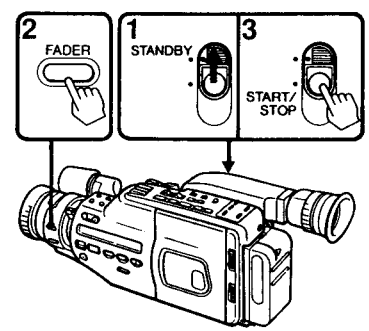
Recommended accessory

When shooting in macro, the depth of field is very shallow, so pay attention to focusing. To keep the subject in focus, use a tripod.

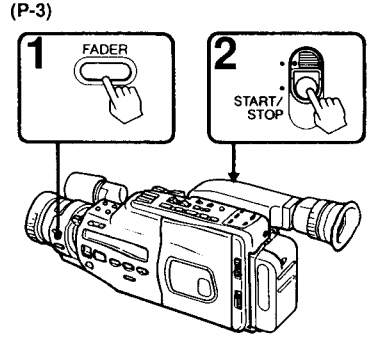
(P-1)



(P-2)



(P-3)



Fade-in and Fade-out

You can fade-in or fade-out to give your recording a preofessional appearance.
When fading-in, the picture will gradually appear from black. The sound will also gradually increase.
When fading-out, the picture will gradually fade to black. The sound will decrease. **(P-1)**

To Fade-in

(P-2)

1 Slide STANDBY up to set the camcorder in the standby mode.

2 Press FADER.

3 Press START/STOP.
Fade-in is performed and recording will start.

To Fade-out

(P-3)

1 While recording, press FADER.

2 Press START/STOP to stop the recording.
Fade-out is performed and then recording stops.

To cancel the fade-in/fade-out function

Before pressing START/STOP, press FADER again.

If you want to use the fade-in/fade-out function repeatedly

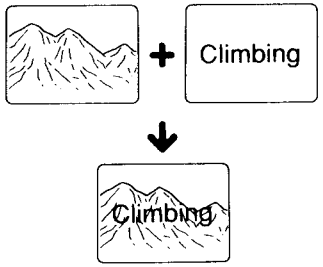
Start from step 1 each time.

When the date/time (page 25) or age (page 50) is displayed

The date/time or age does not fade-in or fade-out.

Superimposing a Title

(Q-1)



You can superimpose your own hand-lettered message or illustration (title) over the picture during recording or playback (editing). (Q-1)

Before recording, store a title.

Storing a Title (Q-2)

Before storing

- Make a desired title card.
  Use a plain, white card and draw a title with a dark colour in thick letters.
- You can choose from 8 colours for your title.
- Make sure the lithium battery is installed. (page 18)

How to store

1 While pressing the green button, set POWER to CAMERA.

2 Slide STANDBY up to set the camcorder in the standby mode.

3 Point the camcorder to the title card and adjust the focus.
To focus the subject, use the close-up function.

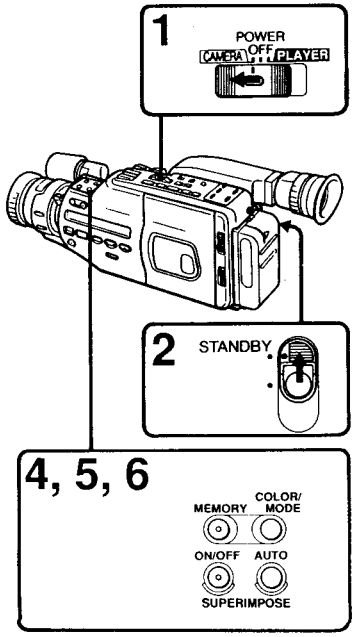
4 Press MEMORY to store the title.

5 Press COLOR/MODE and select the title colour.
Each time you press the button, the indication changes as follows.
WHT (white) → BLUE → GRN (green) → CYAN → RED → BLK (black) ← YEL (yellow) ← VIO (violet) ←

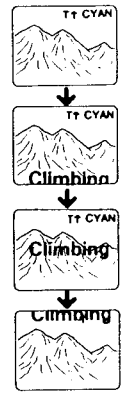
6 Press ON/OFF to turn off the title.

To check the title
Press ON/OFF in the standby mode.
To turn off the title, press the button again.

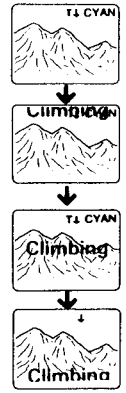
(Q-2)



(Q-3)

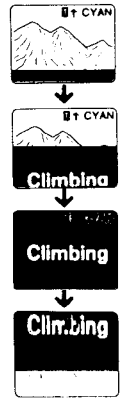


(Q-4)

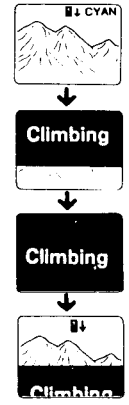


(Q-5)

(Q-6)



(Q-7)



Various Display Modes of the Title

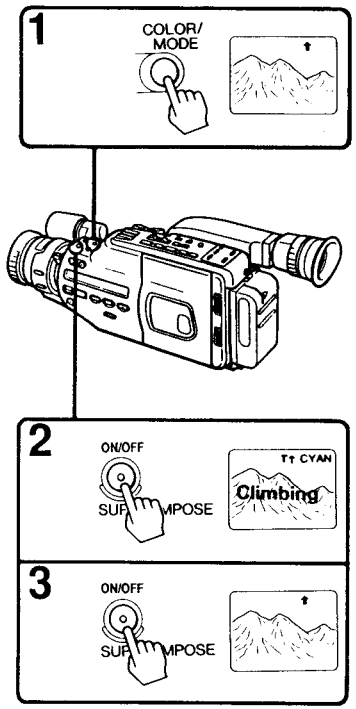
You can scroll your title up or down, or reverse the title.
Select the display mode of the title from the following table.

Display mode	Indication in the viewfinder
Scrolling up the tile (Q-3) The title scrolls up and stops at the center.	↑
Scrolling down the title (Q-4) The title scrolls down and stops at the center.	↓
Reversing the title with the picture (Q-5)	T
Scrolling up the reversed title (Q-6)	T↑
Scrolling down the reversed title (Q-7)	T↓
Normal display mode	No indication
Auto-superimposing	└ AUTO

Note on scrolling
You can scroll the title only when the camcorder is in the recording standby, recording, or normal playback mode. In the other modes (see "Various Playback Modes" on page 56), you can select only reversing (T) or normal display mode. Also scrolling will be cancelled when you set the camcorder in the other modes after selecting scrolling.

About memory back up
The camcorder uses the lithium battery on the bottom to keep the title in memory. The lithium battery life is approximately 1 year.

(Q-8)



Superimposing a Title on Your Tape

The following shows how to superimpose a title using an example in which the title in cyan scrolls up. **(Q-8)**

1 Press COLOR/MODE to select the display mode of the title in the standby or playback pause mode.

2 Press ON/OFF at the point from which you want to insert the title in the standby mode, during recording, in the playback pause mode or during playback.
You can change the title colour by pressing COLOR/MODE.
Each time you press the button, the colour indication changes.

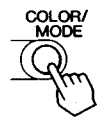
3 Wait for a while and press ON/OFF again.
The title goes out.

About the colour and the display mode indications
The colour and the display mode indications in the viewfinder are not recorded.

If you press EDITSEARCH during recording
The title goes out. After performing the editsearch or recording review function, the title appears again.

If you want to record the title during playback
Make connections for editing and record the title on another VTR. (See page 59.)

(Q-9)



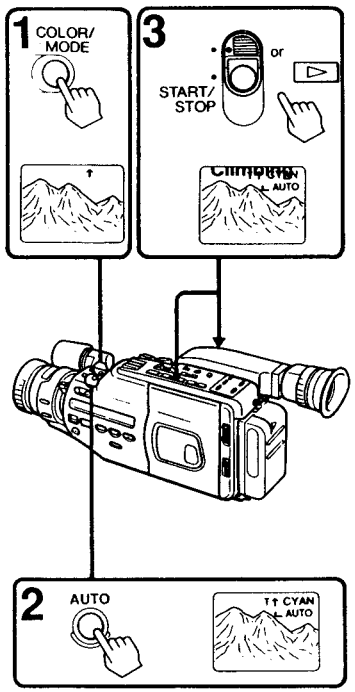
Function of the COLOR/MODE button
This button has a double function: one is to select the title colour and the other is to select the title display mode.
Its function depends on if the title is displayed or not. **(Q-9)**

To select the colour
1 Press ON/OFF to display the title.
2 Press COLOR/MODE.
Each time you press the button, the colour indication changes as follows:
WHT (white) → BLUE → GRN (green) → CYAN → RED
↑ ↓
BLK (black) ← YEL (yellow) ← VIO (violet) ←

To select the display mode
1 If the title is displayed, press ON/OFF so that the title disappears.
2 Press COLOR/MODE.
Each time you press the button, the display mode indication changes as follows:
No indication (normal mode) → ↑
↓ ← ▯↑ ← ▯ ← ↓

↑ : Title scroll up mode
↓ : Title scroll down mode
▯ : Title reverse mode
▯↑ : Title reverse and scroll up mode
▯↓ : Title reverse and scroll down mode

(Q-10)



Superimposing a Title at the Beginning

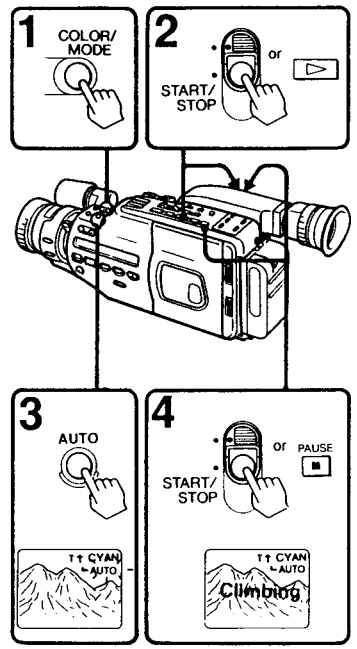
You can clear the title automatically after displaying it for a few seconds. (Auto-superimposing) **(Q-10)**

1 **Press COLOR/MODE to select the display mode of the title in the standby or playback pause mode.**

2 **Press AUTO.**

3 **Start recording or playback.**
The title is displayed in the selected mode and disappears after a few seconds.

(Q-11)



Superimposing a Title Before the Tape Stops

You can display the title automatically for a few seconds after you press START/STOP or ▮▮ PAUSE to stop recording or playback. (Auto-superimposing) **(Q-11)**

1 **Press COLOR/MODE to select the display mode of the title in the standby or playback pause mode.**

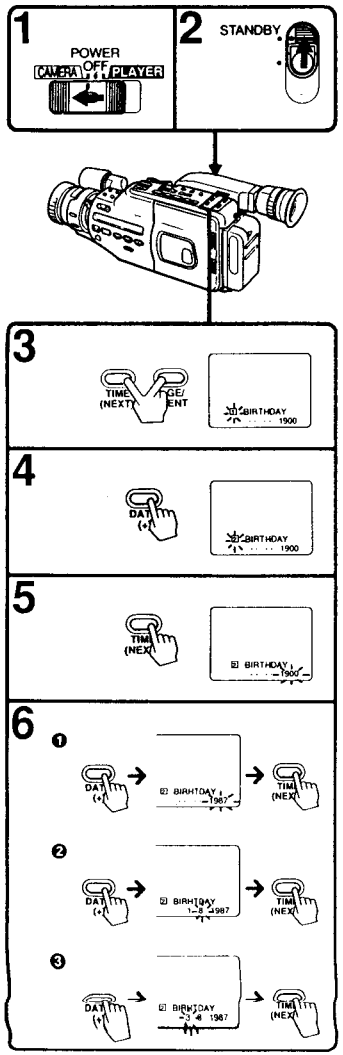
2 **Start recording or playback.**

3 **Press AUTO.**

4 **Press START/STOP or ▮▮ PAUSE at the point which you want to stop recording or playback.**
After the title is displayed for a few seconds, recording or playback stops.

The auto-superimposing is cancelled when:
- The auto-superimposing is performed once.
- You press AUTO again before the superimposing is performed.
- You perform other operations (e.g. editsearch or various speed playback) in the standby or playback pause mode.
- You press ON/OFF before superimposing is performed.

(R-1)



Recording the Age of Your Child

You can record the age (in years and months) of your child, by storing his/her birth date in your camcorder.
Once you store your child's date of birth, your child's age is automatically updated and displayed by pressing a single button. In this way, you can make a record of your child's development.
Besides age, you can also store the date of a specific event, and record how many years and months have passed since then.
You can record up to three ages or events.

Storing the Birth Date/Event Date

Before you begin
Before you store a birth date in your camcorder, make sure that power source is connected, that the lithium battery is installed and that the date is correctly set.

How to store (R-1)
Example: Store "3.8. 1987" in memory 2.

1 Set POWER to CAMERA while pressing the green button.

2 Slide STANDBY up.

3 Press AGE/EVENT and TIME (NEXT) simultaneously for more than one and a half seconds until "[1] BIRTHDAY -- -- 1900" appears and [1] blinks in the viewfinder.

4 Press DATE (+) to select [2].
Each time you press DATE (+), the display changes as follows:

[1] BIRTHDAY → [2] BIRTHDAY
↑ [3] EVENT ←

Although "EVENT" is displayed on [3], you can use it for age as well. [1] and [2] can also be used for event.

5 Press TIME (NEXT).
The "1900" indication blinks.

6 Enter the birth date.
First adjust the blinking digits with DATE (+), and then press TIME (NEXT).
The age is displayed when all the items are

If you missed the desired number with DATE (+)
Keep pressing DATE (+). The number changes as follows:
Year: 1900 → 1901 → current year
↑ current year – (minus) 99 ←

Month: 1 → 2 → 12 → -- --
↑

Day: 1 → 2 → 31
↑

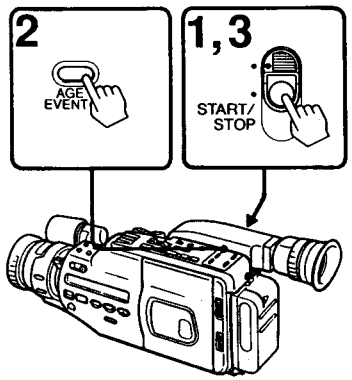
To correct/change the setting
Follow the procedure from step 1 again.

To advance the digits faster
Keep DATE (+) pressed.

To preset the year before 1900
1 After step 5 on page 48, keep pressing DATE (+) until the current year is displayed.
2 Press DATE (+) again.
The year goes back 99 years.
(example: 1991 ➡ 1892)
3 Go to step 6.

When in 2000
"--.-- 1901" is displayed in step 3 on page 48. After that, it advances every year as "1902, 1903, ...".

(R-2)



Recording the Age

You cannot add the age later during playback or editing. Be sure to follow the procedure below. (R-2)

1 During recording, press START/STOP at the point where you want to insert the age indication.
The camcorder is set in the standby mode.

2 Press AGE/EVENT to select the indication you want to record.
Each time you press AGE/EVENT, the indication changes as follows:

→ No indication → [1] The first age →
[3] The third age ← [2] The second age ←

An item with no presetting is skipped.
The [1], [2], or [3] indication goes out.

3 Press START/STOP.
Recording starts again.
The age displayed in the viewfinder is recorded with the picture.

To stop recording the age
Press AGE/EVENT until the indication goes out.

To change the display while recording
Press AGE/EVENT until the indication you want to record is displayed. Recording of the indication you selected starts when [1], [2], or [3] goes out.

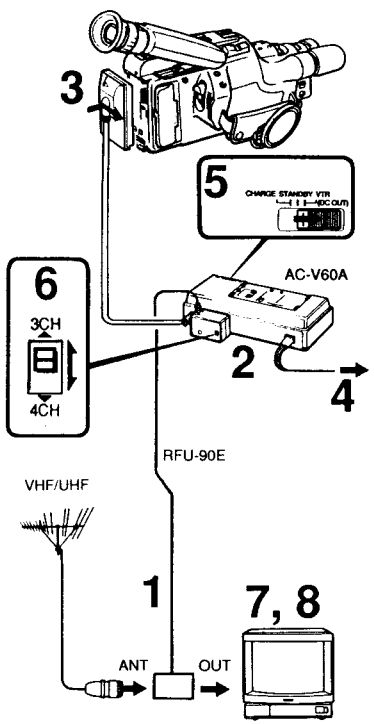
To cancel the stored birth date/event date
1 Proceed steps 1 to 4 of "Storing the Birth Date/Event Date" on page 48 and select the item you want to cancel.
2 Press TIME (NEXT) twice.
"Month" blinks.
3 Press DATE (+) until "--.--" appears.
4 Press TIME (NEXT).
The birth date/event date is deleted from the memory and is not displayed when you press AGE/EVENT.

About memory back-up
The camcorder uses the lithium battery on the bottom to keep the birth date/event date in memory. The lithium battery life is approximately 1 year.

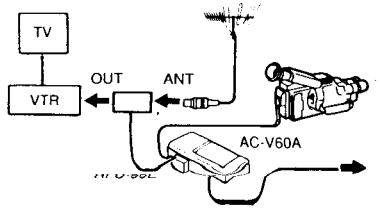
When you connect the camcorder to a TV
If you do not use the data-screen function, the age indication will appear on the TV screen when the [1], [2], or [3] indication goes out in the viewfinder and recording starts.

Connections for Playback

(S-1)



(S-2)



You can easily make a proper connection of the camcorder and TV by using the supplied AC-V60A AC power adaptor. Check the following connecting examples and go to the appropriate section to make the necessary connections.

Case 1: Connecting the camcorder directly to the TV without video/audio input jacks

Case 2: Connecting the camcorder directly to the TV with video/audio input jacks

Case 1: Connecting a TV without Video/Audio Input Jacks

For the customers supplied with the RFU-90E (S-1)

Before you begin
- Use the supplied RFU adaptor and AC power adaptor.
- Make sure that the TV is turned off.

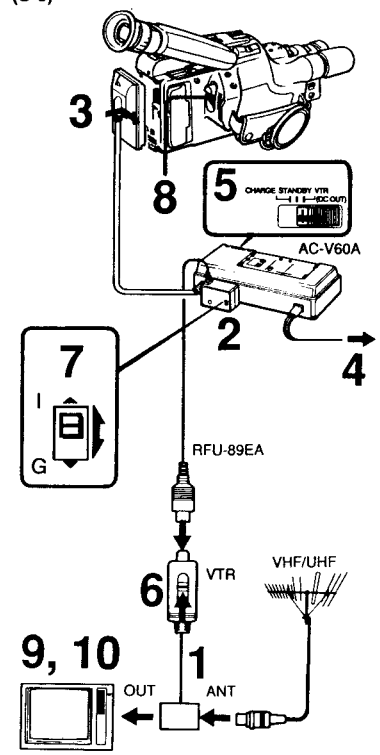
How to connect
1 Connect the antenna and TV to the RFU adaptor.
2 Connect the RFU adaptor to the AC power adaptor.
3 Attach the connecting plate of the AC power adaptor to the camcorder.
4 Connect the AC power adaptor to a wall outlet.
5 Set CHARGE/VTR of the AC power adaptor to VTR.
6 Select the RF unit selector of the adaptor to 3CH or 4CH, whichever is not active in your area.
7 Turn on the TV and select the 0 position.
8 Tune the TV so that you can get picture and sound from the camcorder.

Usually keep the AC power adaptor, the RFU adaptor and the TV connected.

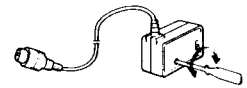
When you watch a TV programme
Set the CHARGE/VTR selector on the AC power adaptor to STANDBY or turn off the power of the camcorder.

If your TV is connected with a VTR (S-2)
Connect the camcorder to the VTR instead of the TV.

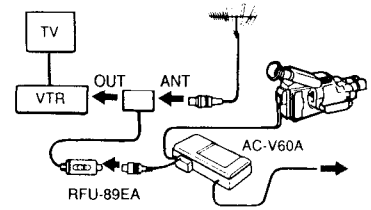
(S-3)



(S-4)



(S-5)



For the customers supplied with the RFU-89EA (S-3)

Before you begin
- Use the supplied RFU adaptor and AC power adaptor.
- Make sure that the TV is turned off.

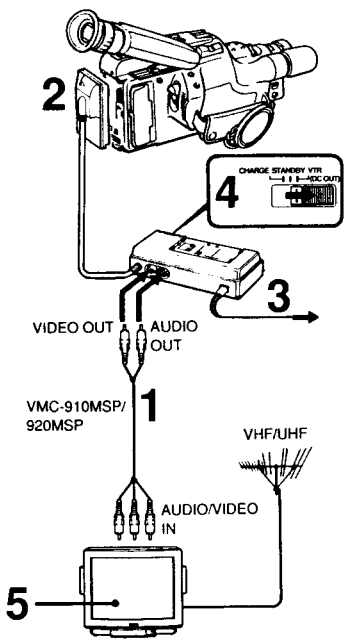
How to connect
1 Connect the antenna and TV to the RFU adaptor.
2 Connect the RFU adaptor to the AC power adaptor.
3 Attach the connecting plate of the AC power adaptor to the camcorder.
4 Connect the AC power adaptor to a wall outlet.
5 Set CHARGE/VTR of the AC power adaptor to VTR.
6 Set the selector switch of the aerial selector to VTR.
7 Set the I/G selector of the RFU adaptor according to the TV system of your country.
8 Set POWER of the camcorder to CAMERA, insert a tape and slide STANDBY up.
9 Turn on the TV and select a programme position that is not used to receive a TV station.
10 Tune the TV so that you can get picture and sound from the camcorder.

When the playback picture is not free of disturbance
1 Set the selector switch of the aerial selector to ANT.
2 Select programme position on the TV between UHF channels 30 and 39, so that the TV shows no picture and a steady rustling sound or no sound is heard.
3 Set the selector switch of the aerial selector to VTR.
4 Turn the RF channel setting screw of the RFU adaptor slowly with the supplied screwdriver so that playback picture is clearly displayed on the TV screen. **(S-4)**

Usually keep the AC power adaptor, the RFU adaptor and the TV connected.

If your TV is connected with a VTR
Connect the camcorder to the VTR instead of the TV. **(S-5)**

(S-6)



Case 2: Connecting a TV with Video/ Audio Input Jacks

(S-6)

Before you begin

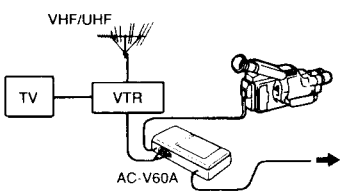
- Use the supplied AC power adaptor and appropriate A/V connecting cable.
- Make sure that the TV is turned off.

How to connect

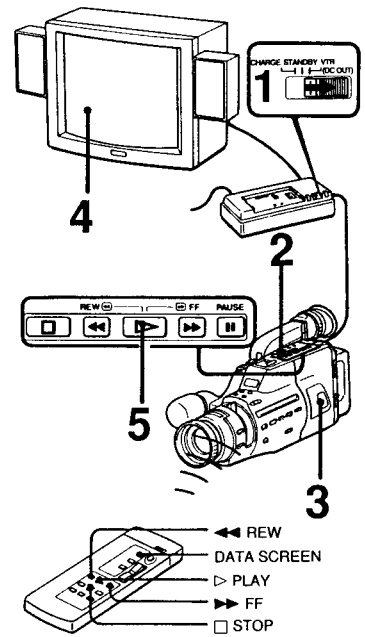
1 Connect the AC power adaptor to the TV. Use an appropriate A/V connecting cable according to the connector type of your TV. Sony offers you the following cables (not supplied):
[a] VMC-710MP/720MP: to phono and BNC-type
If your TV has stereo type audio inputs, use VMC-910MSP/920MSP.
[b] VMC-2104: to 21-pin (EUROCONNECTOR)
If your TV has stereo type audio inputs, use VMC-2106.
2 Attach the connecting plate of the AC power adaptor to the camcorder.
3 Connect the AC power adaptor to a wall outlet.
4 Set CHARGE/VTR of the AC power adaptor to VTR.
5 Set the TV/VIDEO selector on the TV to VIDEO.

If your TV is connected with a VTR (S-7)
Connect the AC power adaptor to the VTR instead of the TV.

(S-7)



(T-1)



Playing Back a Tape

The supplied wireless Remote Commander is useful to control the camcorder from a distance. When using it, be sure to set the REMOTE COMMANDER ON/OFF switch to ON.

(T-1)

1 Set CHARGE/VTR on the AC power adaptor to VTR.

2 Set POWER to PLAYER while pressing the green button.

3 Insert a tape.

4 Turn on the TV (or the VTR).

- For a TV with video/audio input jacks, set the TV/VIDEO selector to VIDEO.
- For a TV without video/audio input jacks, select the programme position for playing back the camcorder.

5 Press ▷.
Playback begins.

To stop playback, press □.

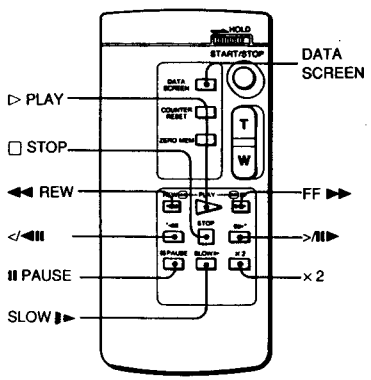
To rewind the tape, press ◀◀.

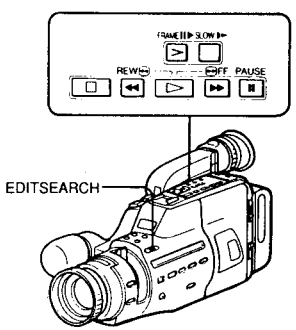
To advance the tape rapidly, press ▶▶.

To make the same indications in the viewfinder on the TV, press DATA SCREEN. To clear them, press it again.

After playing back
Set POWER on the camcorder to OFF and CHARGE/VTR on the AC power adaptor to STANDBY.

(T-2)





Various Playback Modes

(T-2)

To view the still picture (playback pause)
Press II PAUSE during playback.
II appears in the viewfinder.
To resume normal playback, press ▷ or II.
Note:
When the still picture mode lasts for 5 minutes or more, the camcorder automatically enters the stop mode.

To change the playback direction
Press < /◀II for the reverse or > /II▶ for the forward direction during playback. > on the camcorder is only for the forward direction.
–×1 or ×1 appears in the viewfinder.

To view the picture at 1/5 speed (slow playback)
Select the playback direction with < /◀II or > /II▶, and then press SLOW I▶ during playback.
SLOW I▶ on the camcorder is only for the forward direction.
◀I or I▶ appears in the viewfinder.
To resume normal playback, press ▷.
Note:
When slow playback lasts for 1 minute or more, the forward or reverse playback at the normal speed starts automatically, depending on the tape direction.

To view the picture at double speed (only on the Commander)
Select the playback direction with < /◀II or > /II▶, and then press ×2 on the Commander.
–×2 or ×2 appears in the viewfinder.
To resume normal playback, press ▷.

To view the picture frame-by-frame
In the still picture mode, press < /◀II or > /II▶. Each time you press, the picture appears by a frame.
II▶ on the camcorder is only for the forward direction. ◀II or II▶ appears in the viewfinder.
If you keep pressing ◀II/II▶, playback at 1/25 speed starts.
To resume normal playback, press ▷.

To locate the desired scene (picture search)
Keep pressing ◀◀ or ▶▶ during playback or in the still picture mode. ⏪ or ⏩ appears in the viewfinder.
To resume normal playback, release the button.

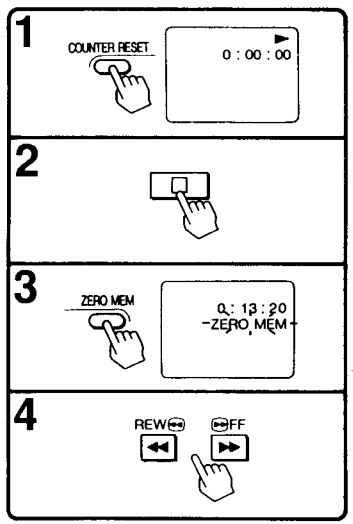
To locate the desired scene quickly (skip scan)
Press ◀◀ during rewinding or ▶▶ during advancing the tape rapidly. ⏪ or ⏩ appears in the viewfinder.
To resume normal playback, press ▷.

About the playback sound
In the various playback modes, streaks appear. The sound can be heard during playback at double speed in forward direction, but may not be clear as normal speed playback.

If the still picture, frame-by-frame picture, or slow playback picture is noisy
Set the camcorder in slow playback mode, and press the + or – side of EDITSEARCH until the least noisy picture appears.

Note
Streaks appear in the still picture. They are wider when playing back an SP-recorded tape.

(U)



Using the Tape Counter

During recording or playback, the digits on the counter indicate the actual recording or playback time.

To Index the Whole Tape

Press COUNTER RESET at the beginning of the tape so that the counter shows "0:00:00". Write down the counter reading at a particular point so that you can easily find that point later by referring to the tape counter.

To Return to a Pre-registered Point

(U)

1 During playback, press COUNTER RESET at the point you later want to locate. The counter shows "0:00:00".

2 Press □ when the playback has finished, as usual.

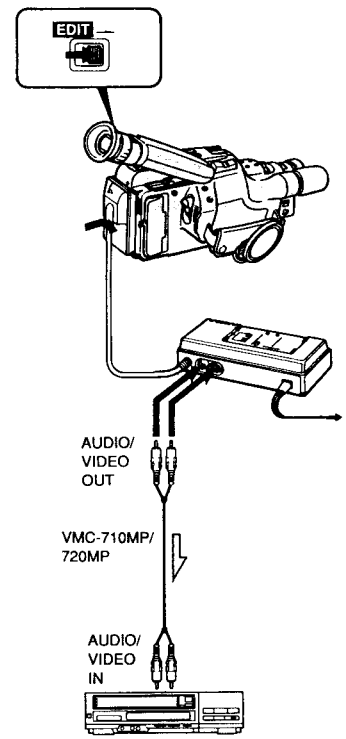
3 Press ZERO MEM.
The "ZERO MEM" indicator blinks in the viewfinder.

4 Press ◀◀ or ▶▶.
The tape rewinds or advances and stops automatically when the counter reaches approximately zero.

Notes on the tape counter and ZERO MEM button

- The counter reading and the point of the tape may not correspond exactly. Use the counter as a guide. There will be a time lag of several seconds especially when you repeat fast-forward running/ rewinding and play back the tape recorded in LP and SP modes mixed.
- Be sure to press ZERO MEM after you stop the tape. It does not function during playback.
- The ZERO MEM mode is cancelled automatically once the tape is rewound or sent forward to the point where you pre-registered.

(V)



Editing onto Another VTR

You can create your own video programme by editing with any other 8 8-mm, ß Betamax or VHS VHS format VTR. You can also superimpose and record the titles during editing.

Before You Begin

- Make connections using an appropriate audio/ video connecting cable according to the connector type of your VTR. **(V)**
  Sony offers you the following cables (not supplied).
  [a] VMC-710MP/720MP: to phono and BNC-type
  If your VTR has stereo type audio inputs, use VMC-910MSP/920MSP.
  [b] VMC-2104: to 21-pin (EUROCONNECTOR)
  If your VTR has stereo type audio inputs, use VMC-2106.
- Set the input selector of the VTR to LINE, if available.

Operation

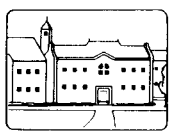
1 Insert a tape to be recorded into the recording VTR.
2 Set EDIT on the camcorder to the direction of the arrow (EDIT ON).
3 Set CHARGE/VTR on the AC power adaptor to VTR.
4 Set POWER of the camcorder to PLAYER and insert your recorded tape.
5 Play back on the camcorder and locate the point where you wish to start editing and set the camcorder to the playback pause mode.
6 On the recording VTR, locate the recording starting point and set the VTR to the recording pause mode.
7 Press II of both VTRs simultaneously to start editing.

To stop editing momentarily, press II on the recording VTR.
To edit more scenes, repeat steps 5 to 7.
To stop editing, press □ on both VTRs.

Use of the EDIT switch
When you set EDIT to the direction of the arrow (EDIT ON), picture and sound deteriorations resulting from editing can be kept to the minimum. Avoid using the edited tape for multiple generations of editing. After *editing, be sure to set this switch in the opposite* direction of the arrow (EDIT OFF).
If you use the DATA SCREEN function
You can record the indications displayed on the TV screen.

(W-1)

(W-2)



Hints for Better Shooting

Getting Stable Pictures

Take a good posture for shooting (W-1)
For hand-held shots, it is important to hold the camcorder properly.

- Hold the camcorder firmly and secure it with the grip belt so that you can easily manipulate the camcorder with your thumb.
- Place your right elbow firmly against your side.
- Place your left hand under the camcorder to support it. When adjusting the focus manually, make sure the camcorder does not move.
- Place your eye firmly against the viewfinder eyecup.

Use a tripod
If you have a tripod for a still camera, you can also use it with the camcorder. If a tripod is not available, try placing the camcorder on a tabletop or any other flat surface of suitable height.

Keep the horizontal plane level (W-2)
The horizontal plane can be easily determined by using the viewfinder frame as a reference.

Planning Ahead

If you are going to edit the tape after recording
Shoot the scene a little longer to make the editing easier.

If you are not going to edit the tape after recording
First record a title and then use the START/STOP button to make a smooth recording.

Lighting

Shoot with the sun behind you
When the light source is behind the subject, or in the following situations, the subject will be recorded too dark and the background too light.

- The subject is indoors and there is a window behind the subject.
- Bright sources such as fluorescent or incandescent lamps are included in the scene.
- You are shooting a person wearing white or shiny clothes in front of a white background. In this case, the face will be recorded too dark.

Use video lights in the dark
To get the best colours, a sufficient light level must be maintained.
Photography lamps or halogen lamps are recommended. For best results, use of Sony video lights are recommended since their weight and low heat output levels allow safe, direct connection to the camcorder.
For detailed instructions on proper use of the light, read its instruction manual.

Brightness levels
Using the following chart as a reference, take a few minutes to familiarize yourself with brightness levels to improve your recording technique.

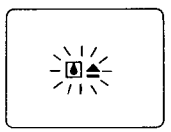
Situation	Brightness	Condition
Snow-covered mountains Snow fields Sandy beach, clear day in summer	Unit: lux	ND filter recommended
Clear day, mid day (100,000 lux) Clear day, mid-afternoon (35,000) Overcast day, mid-day (32,000)	100,000	
Overcast day, one hour after sunrise (2,000) Office lit by fluorescent lamps, near window (1,000) Clear day, one hour before sunset (1,000) Department store counter (500 – 700) Station wicket (650) Office lit by fluorescent lamps (400 – 500) Room lit by two 30 W fluorescent lamps (300) Subway station platform (300)	10,000 1,000 500 300	Normal recording
Arcade at night (150 – 200)	100	
Theater lobby (15 – 35) Candlelight (10 – 15)	10	Video light recommended

Notes and Precautions

Notes on Moisture Condensation

If the camcorder is brought directly from a cold place to a warm place, moisture may condense inside the camcorder, on the surface of the tape or on the lens. In this condition, the tape may stick to the head drum and be damaged or the unit may not operate correctly. To prevent possible damage under these circumstances, the camcorder is furnished with moisture sensors. However, take the following precautions.

(X-1)

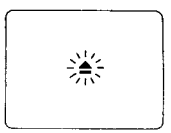


If moisture condenses inside the unit (X-1)

Moisture is present inside the camcorder when:
- The 💧 indication in the viewfinder blinks. When the tape is inserted, the ⏏ indication also blinks.
- Beeps sound continuously for about 5 seconds when the BEEP switch is set to ON.

In such cases, no function except for tape ejection will work.
Eject the tape, turn off the camcorder, and leave it with the cassette holder open for at least 1 hour.
The camcorder can be used again if the 💧 indication does not appear when the power is turned on again.

(X-2)



If moisture condenses on the surface of the tape (X-2)

Moisture is present on the surface of the tape when:
- The ⏏ indication blinks inside the viewfinder when the tape is inserted and a tape transport button (▷, ◀◀ etc.) is pressed.
- Beeps sound continuously for about 5 seconds when the BEEP switch is set to ON.

In such cases, no function except for tape ejection will work.
Eject the tape and let it sit for at least 1 hour.
The tape can be used again if the ⏏ indication does not appear when the tape is inserted and a tape transport button is pressed.

If moisture condenses on the lens

No caution indications will appear, but the picture becomes dim.

Turn off the power and leave the camcorder unused for at least 1 hour.

(Y)

Notes on Video Head Cleaning

(Y)
To ensure clear picture, clean the video heads periodically.
When playback pictures are noisy or hardly visible, the video heads may be contaminated.
[a] Slight contamination
[b] Critical contamination
In such cases,
1 Clean the video heads with the Sony V8-25CLH cleaning cassette (not supplied), referring to its instructions.
2 After cleaning, check if the picture is clear by recording or playing back with an ordinary tape.
3 If the picture is still noisy, repeat cleaning. (Do not repeat cleaning more than 5 times.)

Caution
Do not use a commercially available wet-type cleaning cassette. It may damage the video heads.

Note
If the V8-25CLH cleaning cassette is not available in your area, consult your Sony service facility.

Precautions

On operation

- Operate the camcorder on 6.0V (battery pack), 7.5V (AC power adaptor), or 9.0V (alkaline batteries).
- For DC or AC operation, use the accessories recommended in this manual.
- Should any solid object or liquid fall into the casing, unplug the camcorder and have it checked by qualified personnel before operating it any further.
- Do not hold the camcorder by the viewfinder or the microphone.
- Avoid rough handling or mechanical shock. Be particularly careful of the lens.
- Keep the lens cap on the lens when not using the camera.
- Do not wrap up the camcorder and operate it because heat may build up internally.
- Keep the camcorder away from strong magnetic fields or mechanical vibration.
- Do not put the camcorder on the sand.

On care

- When the unit will not be used for a long time, periodically turn on the power, operate the camera section and player section and play back a tape for about 3 minutes.
- Clean the lens with a soft brush to remove dust. If there are fingerprints on it, remove them with a soft cloth.
  Clean the camcorder body with a dry, soft cloth, or a soft cloth lightly moistened with a mild detergent solution. Do not use any type of solvent which may damage the finish.

Note on copyright

Television programmes, films, video tapes and other materials may be copyrighted. Unauthorized recording of such materials may be contrary to the provision of the copyright laws.

Using your Camcorder Abroad

Each country has its own electricity system and TV colour system. Before using your camcorder abroad, check the following points.

Power Sources

You can use your camcorder in any country with the supplied AC power adaptor within 110V to 240V AC, 50/60 Hz.

Differences in colour systems

You can view the playback picture in the viewfinder. However, if you want to view the playback picture on a TV, it must be a PAL system based TV and should have video/audio inputs.

PAL system countries
Australia, Austria, Belgium, China, Denmark, Finland, Germany (Former West Germany), Great Britain, Holland, Hong Kong, Italy, Kuwait, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, Thailand, etc.

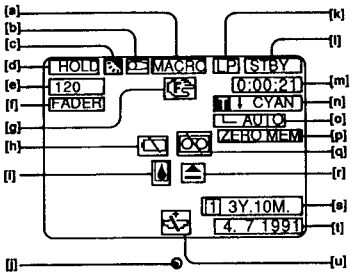
PAL M system country
Brazil

PAL N system countries
Argentina, Paraguay, Uruguay

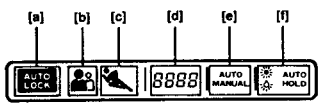
NTSC system countries
Bahama Islands, Canada, Central America, Japan, Korea, Mexico, Taiwan, The Philippines, U.S.A., etc.

SECAM system countries
Bulgaria, France, Hungary, Iran, Iraq, Monaco, Poland, The Soviet Union, etc.

(Z-1)



(Z-2)



Indications Inside the Viewfinder and the Display Window

Inside the Viewfinder

(Z-1)

[a] MACRO AF is pressed. (MACRO)
[b] WIND is selected.
[c] BACK LIGHT is pressed.
[d] White balance mode (☀, ☁, HOLD)
[e] PROGRAM AE setting, or Shutter speed
[f] FADER is pressed.
[g] Manual focusing
[h] "Exchange battery."
[i] Moisture has condensed.
[j] Shows up during recording.
When blinking: "Exchange battery or tape."
[k] Recording or playback mode (LP or SP)
[l] Tape transport mode
[m] Tape counter
[n] Title mode and colour
[o] Auto superimposing
[p] ZERO MEM is pressed.
[q] "Exchange tape or no tape inside."
[r] "Trouble has occurred" (⏏) or "Clean video heads."
[s] Age
[t] Date or time
[u] "Replace lithium battery."

In the Display Window

(Z-2)

[a] Appears in automatic adjustment mode
[b] Appears in portrait mode
[c] Appears in sports mode
[d] Shutter speed
[e] Focus mode
[f] White balance mode